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Hence, $e^3 = (1 + e + e^2) \tan^3 \phi$, from which we obtain,

$$\tan \phi = \sqrt{\frac{e^3}{e^2 + e + 1}}.$$

Solved in a similar manner by J. Scheffer.

PROBLEMS FOR SOLUTION.

GEOMETRY.

379. Proposed by G. I. HOPKINS, Manchester, N. H.

Construct the triangle, having given base, vertical angle, and ratio of its altitude to difference of other two sides.

380. Proposed by W. J. GREENSTREET, A. M., Stroud, England.

$ABCD$ is a quadrilateral, sides in order a, b, c, d , and $B + D = \theta$. Express the diagonals in terms of a, b, c, d, θ .

MECHANICS.

355. Proposed by the late G. B. M. ZERR, Ph. D.

Assuming the resilience of volume of mercury to be constant at all depths and to be 54.20×10^{10} in C. G. S. units and that a mile = 160933 centimeters. Find the depth of an ocean of mercury at a point where its density is double the surface density, 13.596.

356. Proposed by the late G. B. M. ZERR, Ph. D.

A cantilever beam length a is loaded with c pounds per running foot at its fixed end and increases uniformly to b pounds per running foot at its free end. Find the deflection at the free end due to this load.

357. Proposed by W. J. GREENSTREET, M. A., Stroud, England.

A portion of a circular cylinder cut off by two planes through the axis rests with its curved surface on two rough horizontal rails parallel to its axis, the coefficients of friction μ_1, μ_2 at upper and lower rails respectively. If the body is in limiting equilibrium at both rails when the plane through the axis and the center of gravity is perpendicular to both rails, find the distance of the center of gravity in terms of the distance between the rails, the inclination of their plane to the horizon, and the coefficients of friction.

NUMBER THEORY AND DIOPHANTINE ANALYSIS.

177. Proposed by J. EDWARD SANDERS, U. S. Weather Bureau Office, Chicago, Ill.

Factor (if possible) 1,111,111,111,111,111,111.